Optical characteristics of nano-structured ZnO:Ga powders prepared by a fluidized reactor

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Zinc oxide has been understood as one of promising materials to be developed as gas sensing materials by detecting several gases in various different processes. Optical characteristics of ZnO:Ga powders prepared in a continuous and one-step fluidized reactor were investigated. To control the ZnO, Ga^{3+} was doped into the lattice of host material. The prepared ZnO:Ga powders were analyzed by means of SEM, XRD, DRS and PL. The intensity and shift of main peaks in XRD patterns and crystallite size of ZnO:Ga powders increased with increasing flow rate of micro bubbles(U_{MB}), indicating that the fluidization of micro drops during the formation of powders could help the doping of Ga^{3+} ions into the lattice of ZnO. The XRD, PL and DRS analyses indicated that Ga^{3+} was successfully doped into ZnO lattice. The surface morphology of ZnO:Ga powders became more wrinkled and furrowed with increasing U_{MB}, due to the increase of micro shear force and strain. The room temperature photoluminescence indicated that the crystal quality of as-prepared ZnO:Ga powders was getting better with increasing U_{MB}.